

CLAIMS

1. An electrochemical cell comprising:

- (a) a cathode comprising an electroactive sulfur-containing material;
(b) an anode; and
(c) a non-aqueous electrolyte interposed between said anode and said cathode,

wherein said anode comprises:

- (i) a first anode active layer comprising lithium metal; and
(ii) a multi-layer structure in contact with a surface layer of said first anode active layer, wherein said multi-layer structure comprises three or more layers, wherein each of said three or more layers comprises a layer selected from the group consisting of single ion conducting layers and polymer layers.

2. The cell of claim 1, wherein the thickness of said first anode active layer is 2 to 100 microns.

3. The cell of claim 1, wherein the thickness of said multi-layer structure is 0.5 to 10 microns.

4. The cell of claim 1, wherein the thickness of said multi-layer structure is 1 to 5 microns.

5. The cell of claim 1, wherein said multi-layer structure comprises four or more layers.

6. The cell of claim 1, wherein said multi-layer structure further comprises a metal alloy layer, wherein said metal alloy comprises a metal selected from the group consisting of Zn, Mg, Sn, and Al.

7. The cell of claim 1, wherein said single ion conducting layer of said multi-layer structure comprises a glass selected from the group consisting of lithium silicates,

lithium borates, lithium aluminates, lithium phosphates, lithium phosphorus oxynitrides, lithium silicosulfides, lithium germanosulfides, lithium lanthanum oxides, lithium tantalum oxides, lithium niobium oxides, lithium titanium oxides, lithium borosulfides, lithium aluminosulfides, and lithium phosphosulfides, and combinations thereof.

8. The cell of claim 7, wherein said single ion conducting layer of said multi-layer structure is a lithium phosphorus oxynitride.

9. The cell of claim 1, wherein said polymer layer of said multi-layer structure comprises a polymer layer formed from the polymerization of one or more acrylate monomers selected from the group consisting of alkyl acrylates, glycol acrylates, and polyglycol acrylates.

10. The cell of claim 1, wherein said non-aqueous electrolyte is a liquid electrolyte.

11. The cell of claim 1, wherein said first anode active layer further comprises an intermediate layer selected from the group consisting of temporary protective metal layers and plasma CO₂ treatment layers, wherein said intermediate layer is interposed between said first anode active layer and said multi-layered structure.

12. The cell of claim 1, wherein said anode further comprises a substrate, wherein said substrate is in contact with a surface of said first anode active layer on the side opposite to said multi-layered structure.

13. The cell of claim 12, wherein said substrate is selected from the group consisting of metal foils, polymer films, metallized polymer films, electrically conductive polymer films, polymer films having an electrically conductive coating, electrically conductive polymer films having an electrically conductive metal coating, and polymer films having conductive particles dispersed therein.

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wherein said multi-layer structure comprises three or more layers, and wherein each of said three or more layers comprises a layer selected from the group consisting of ion conducting layers and polymer layers.

The anode of claim 14, wherein said multi-layer structure comprises four or more layers.